

Water-based formulations with fungicidal action

5 The present specification relates to storage-stable aqueous formulations which in addition to hydrolysis-sensitive active compounds comprise special binders for stabilizing the active compounds.

Their sensitivity to hydrolysis imposes conditions on the suitability of many broad-spectrum fungicides for use in water-based systems.

10 The mode of action of, for example, trihalogenomethylthio compounds such as dichlofluanid, tolylfluanid, fluorfolpet and folpet is based on the ability of the N-S bond to open in order subsequently to react nucleophilic groups (e.g. SH groups).

15 The half-life of the majority of these compounds in aqueous systems is a few minutes at alkaline pH levels (about pH 9), in the neutral range (about pH 7) a few hours, and in the acidic range (about pH 4) a few days.

20 Their use in water-based, so-called ready-to-use wood preservation varnishes and primers, emulsion paints and antifouling paints is therefore not an option owing to the short shelf life, which derives from the instability of the fungicides.

Surprisingly and totally unexpectedly it has now been found that active compounds sensitive to hydrolysis can be stabilized by using specific binder systems.

25 The specification therefore provides aqueous systems comprising at least one hydrolysis-sensitive active compound in combination with binders which consist of alkyd resins based on vegetable oils and/or acrylate dispersions and which in aqueous systems have a pH  $\leq 7$ .

30 Active compounds sensitive to hydrolysis are, in particular, fungicides, bactericides and insecticides which in acidic, neutral and especially alkaline systems have a half-life of a few minutes to six months.

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Donna J. Veatch

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Such active compounds are, in particular, compounds containing a functional group -N-S-CCl<sub>2</sub>X, where X preferably represents fluorine, chlorine or CHCl<sub>2</sub>.

5 Hydrolysis-sensitive active compounds for the purposes of the invention are, in particular, folpet, captan and captafol and, preferably, dichlofluanid, tolylfluanid and fluorfolpet.

Binders for the purposes of the invention are alkyd resins and acrylate dispersions,  
10 which may also, optionally, be present in copolymeric form and which have the characteristic that in aqueous solutions or emulsions they have a pH  $\leq 7$ , in particular  $\leq 5$ , preferably  $\leq 3$ .

Examples of preferred binders which may be mentioned are as follows:  
15 alkyd/maleic anhydride copolymers, alkyd/modified linseed oil, alkyd resins, alkyd resin/soya oil/linseed oil in combination with acrylate dispersion.

Both the active compounds and the binders are known and are commercially available.

20 The aqueous systems of the invention, or ready-to-use compositions, contain preferably from 0.001 to 90, in particular from 0.01 to 50, more preferably from 0.1 to 5, with particular preference from 0.1 to 2 per cent by weight of active compound and preferably from 3 to 80, in particular from 5 to 50 and, more preferably, from 5  
25 to 30 per cent by weight of binder.

Preferred examples of aqueous systems are water-based paints such as, in particular, emulsion paints and antifouling paints and also, preferably, wood preservatives such as, in particular, wood preservative varnishes and primers.

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5 Aqueous systems optionally include constituents which are common for – in particular – wood preservative varnishes, emulsion paints and antifouling paints, such as pigments, dyes, auxiliaries, binders, emulsifiers, dispersants and further active compounds such as fungicides, insecticides and/or bactericides not sensitive to hydrolysis.

10 The aqueous systems of the invention have the advantage over the known systems that the active compounds are stable for long periods against hydrolysis and decomposition, both in an acidic and in a neutral medium.

The invention is elucidated further by the following examples. The invention is not restricted to the examples. In the text below, percentages are by weight.

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**Example**

5 Tolyfluanid (TF) is incorporated into various water-based wood preservatives with stirring. The samples are tested for their storage stability at room temperature. The amount of active compound in the samples is measured by means of HPLC.

The table below reports the results:

**Table 1**

*pH of Binder*

| Ex.-<br>No | %    | Binder<br>Description                              | <del>pH of</del> | % TF   |                | % TF, storage at RT |           |           |           |            |
|------------|------|--|------------------|--------|----------------|---------------------|-----------|-----------|-----------|------------|
|            |      |  | <del>EA</del>    | theor. | after<br>prep. | 1<br>mth.           | 2<br>mth. | 3<br>mth. | 9<br>mth. | 12<br>mth. |
| 1          | 16.5 | Alkyd/soya/linseed oil<br>+<br>acrylate dispersion | 2.1              | 0.74   | 0.72           | 0.80                | 0.69      | 0.69      | 0.67      | 0.69       |
| 2          | 16.5 | Alkyd  | 3.5-5            | 0.74   | 0.74           | 0.97                | 0.75      | 0.64      | 0.63      | 0.62       |

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